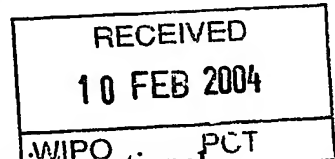


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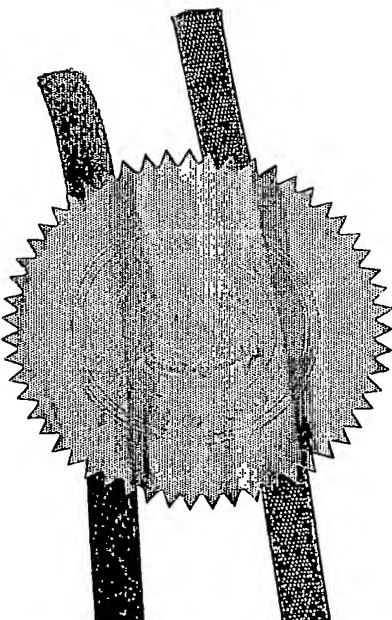
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Title of Invention : IRON WITH FABRIC CONTACT DETECTOR

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0	For receiving Office use only	
0-1	International Application No.	PCT/SG 02 / 00163
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0-4	Form - PCT/RO/101 PCT Request	
0-4-1	Prepared using	PCT-EASY Version 2.92 (updated 01.06.2002)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
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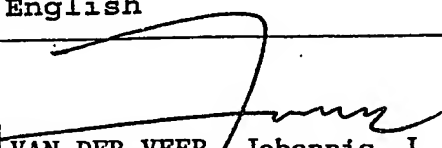
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V	Designation of States		
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	EP: AT BE BG CH&LI CY CZ DE DK EE ES FI FR GB GR IE IT LU MC NL PT SE SK TR and any other State which is a Contracting State of the European Patent Convention and of the PCT	
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	SG	
V-5	Precautionary Designation Statement In addition to the designations made under items V-1, V-2 and V-3, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except any designation(s) of the State(s) indicated under item V-6 below. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit.		
V-6	Exclusion(s) from precautionary designations	NONE	
VI	Priority claim	NONE	
VII-1	International Searching Authority Chosen	European Patent Office (EPO) (ISA/EP)	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	3	-
IX-2	Description	6	-
IX-3	Claims	2	-
IX-4	Abstract	1	EZABST00.TXT
IX-5	Drawings	4	-
IX-7	TOTAL	16	

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	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-11	Copy of general power of attorney	✓	-
IX-17	PCT-EASY diskette	-	Diskette
IX-19	Figure of the drawings which should accompany the abstract	1	
IX-20	Language of filing of the international application	English	
X	Signature of applicant, agent or common representative		
X-1	Name (LAST, First)	VAN DER VEER, Johannis, L.	
X-2	Capacity	Authorized Representative	

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10-1	Date of actual receipt of the purported international application	24 JUL 2002	CX4-07-02
10-2	Drawings:		
10-2-1	Received		
10-2-2	Not received		
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application		
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)		
10-5	International Searching Authority	ISA/EP	
10-6	Transmittal of search copy delayed until search fee is paid		

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11-1	Date of receipt of the record copy by the International Bureau	
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Iron with fabric contact detector

The invention relates to an electric iron having a housing and a soleplate in which at least one outlet opening is provided, means for generating a fine liquid spray or foam or steam and means for delivering said generated fine liquid spray or foam or steam through said outlet opening.

5

Such irons are generally known, mostly as steam irons, although instead of delivering steam, some irons are able to deliver a diluted solution of an additive liquid as a fine spray or as foam to the fabric to be ironed. Delivering steam can be realized by means of a steam chamber or generator in which water is vaporized causing an overpressure that is used to expel steam through outlet openings of the soleplate. In case of a fine liquid spray of additive, the generated steam can be used as a carrier to release the additive. Alternatively, some irons have a pump to deliver a fine liquid spray. To initiate the delivery of steam or a fine liquid spray the user sets or pushes a knob in the steaming or spraying position. If the iron is not yet put in the ironing position for performing the actual ironing movements, it is then possible that the generated steam or spray is delivered outside the area of the fabric to be ironed, which is undesirable. Moreover, when additive liquid is used, spraying outside the area of the fabric is a waste.

20

An object of the invention is to improve the ironing efficiency by starting the delivery of steam or a fine spray of additive or foam only then when a user starts with the ironing process, i.e. with making ironing strokes.

According to the invention an electric iron as described in the opening paragraph is provided with detection means for detecting the presence of a surface in the proximity of the soleplate and for generating a detection signal in response to said detection, and with control means for controlling the delivery of said fine liquid spray or foam or steam in response of said detection signal. In general the surface is the fabric or garment to be ironed. As soon as an user puts an iron in an ironing position, i.e. when the iron is placed on

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the fabric, delivery of steam or a fine liquid spray or foam starts. The detection means gives a feedback signal to activate the release of steam or additive spray or foam. In this way the released steam or spray or foam is applied only to the fabric underneath the soleplate of the iron. In practice, the expression proximity means that the soleplate of the iron is in contact with the fabric.

In a first embodiment the detection means comprise a movable spring biased contact element, said element activating a switch for generating said signal when the soleplate is positioned against said surface thereby depressing said element.

In a second embodiment the detection means comprise resilient means provided between the housing and the soleplate, said soleplate being movable with respect to said housing against the force of said resilient means, and comprise a switch provided between the soleplate and the housing for generating said signal, said switch being activated when the iron is positioned against said surface with a force applied to the housing which is greater than the force of said resilient means.

In a third embodiment the detection means comprise a light emitter and a light sensitive receiver for receiving a reflected light beam from the emitter when the soleplate is in the proximity of said surface, said surface serving as a reflection surface for the light beam, said receiver generating said signal in response to the reflected light beam.

In a fourth embodiment the detection means comprise a pressure detector for detecting the pressure of the generated steam in a flow path between the means for generating said steam and said at least one outlet opening in the soleplate, said signal being generated in response of the pressure when the soleplate is in the proximity of said surface and when said signal exceeds a predetermined threshold value, said iron further comprising a supply tube for adding an additive liquid to the generated steam in said flow path, said supply tube having a valve which opens when said signal exceeds said predetermined threshold value.

In a further embodiment the iron comprises motion detection means for generating a motion signal in response to a motion of the iron, said control means enabling said detection signal in response to said motion signal. Such a motion detection means can e.g. be a commercially known ball type of motion sensor. In this iron, after the detection means gives a feedback signal, the release of steam or additive spray or foam will only be activated after the motion detection means provided a feedback signal that indicates there is a movement of the iron, preferably a movement in the ironing direction.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

5 Fig. 1 shows a first embodiment of an iron with a spring biased contact detector in the soleplate,

Fig. 2 shows a second embodiment of an iron with a spring biased contact detector,

Fig. 3 shows a third embodiment with an IR emitter and receiver and

10 Fig. 4 shows a fourth embodiment with a pressure detector.

In the first embodiment, shown in Fig. 1, the iron comprises a housing 1, a soleplate 2 attached to the lower side of the housing, an electric heating element 3 for heating
15 the soleplate 2, a water reservoir 4, an electric pump 5 and a control device 6. Reference numeral 7 indicates the fabric to be ironed. The soleplate 2 is provided with a steam chamber 8 for generating steam. An outlet 9 of the steam chamber 8 is connected with a number of steam outlet openings 10 provided in the soleplate. A duct 11 connects the water reservoir 4
via pump 5 with the steam chamber 8. A movable spring biased contact element 12 is
20 provided in an opening 13 of the soleplate 2. Said contact element 12 is connected to an electric switch 14. The electric pump 5 and the electric switch 14 are electrically connected to the control device 6. The operation is as follows: presumed that the soleplate 2 is hot enough to produce steam in the steam chamber 8, the iron is positioned on the fabric 7 which causes a depression of the contact element 12. This results in an activation of the switch 14 and a
25 signal is sent to the control device 6 whereupon pump 5 is started to pump an amount of water from the water reservoir 4 through the duct 11 to the steam chamber 8 to generate steam and an immediate delivery of steam through the outlet openings 10 is obtained. Contact element 12 can also be provided behind the soleplate 2 in a housing part at the rear side of the iron.

30 In the second embodiment, shown in Fig. 2 the iron comprises a housing 1, a soleplate 2, an electric heating element 3 for heating the soleplate 2, a water reservoir 4, an electric pump 5 and a control device 6. Reference numeral 7 indicates the fabric to be ironed. In the soleplate 2 an outlet opening 15 is provided in which a fine spray of liquid 16 can be generated. The iron further comprises a reservoir, preferably in the form of a replaceable

cartridge 17 for containing an additive liquid. A duct 18 connects the water reservoir 4 via pump 5 with a spray nozzle 19 provided in the outlet opening 15. A duct 20 connects the cartridge 17 with the duct 18 for adding an amount of additive liquid to the water flow in the duct 18. The duct 20 is provided with an electric valve 21. The soleplate 2 is movable with respect to the housing 1 in a direction perpendicular to the soleplate as indicated with arrows A. Resilient means, for example springs 22 and an electric switch 23 are provided between the soleplate 2 and the housing 1. The electric pump 5, the electric switch 23 and the electric valve 21 are electrically connected to the control device 6. The operation is as follows: when the iron is positioned on the fabric 7 the load of the housing 1, including the reservoirs, the pump etc. causes a force on the springs 22 which results in a depression of the springs 22 thereby activating the switch 23. A signal is sent to the control device 6 whereupon pump 5 is started to pump an amount of water from the water reservoir 4 through the duct 18 to the spray nozzle 19 to generate a fine spray of water or mist. If the user wants to add an amount of additive liquid to the spray, the electric valve 21 can be opened, for example by operating the knob 24 on the housing to send a signal via the control device 6 to the valve.

In the third embodiment, shown in Fig. 3 the iron comprises a housing 1, a soleplate 2, an electric heating element 3 for heating the soleplate 2, a water reservoir 4, an electric pump 5 and a control device 6. Reference numeral 7 indicates the fabric to be ironed. The iron further comprises a reservoir in the form of a replaceable cartridge 25 for containing a foaming liquid in concentrated form. The foaming liquid contains a small amount of surfactant to reduce the surface tension. Ducts 26 and 27 of the water reservoir 4 and the cartridge 25 respectively are connected to a foaming device 28. The duct 27 is provided with an electric valve 29. The foaming device 28 further has an inlet 30 for air. An outlet 31 of the foaming device is connected via the pump 5 to a cavity 32 through a duct 33. The cavity 32 has a discharge opening 34 provided in the soleplate 2. The soleplate 2 is further provided with an infrared emitter 35 and an infrared sensitive receiver 36 arranged in a cavity 37 of the soleplate, which is open toward the fabric 7. The electric pump 5, the infrared emitter 35 and receiver 36 and the electric valve 29 are electrically connected to the control device 6. The operation is as follows: when the iron is switched on the infrared emitter 35 sends a light beam as indicated with arrow E. When the iron is positioned on the surface 7a of the fabric 7 or when the soleplate 2 is at least in the proximity of the fabric 7 the light beam E is reflected by the surface 7a of the fabric 7 and the reflected light beam R is received by the infrared sensitive receiver 36. The receiver generates a signal which is send to the control device 6 whereupon the pump 5 is started to suck water, foaming liquid and air into the foaming

device 28 thereby generating foam. The foam is pumped to the cavity 32, which serves as an expansion device to the foam, i.e. to generated more bubbles. To control the degree of foaming, the amount of foaming liquid supplied to the foaming device 28 can be adjusted by the electric valve 29 which is operable, for example, by the knob 38.

5 In the fourth embodiment, shown in Fig. 4 the iron comprises a housing 1, a soleplate 2, an electric heating element 3 for heating the soleplate 2, a water reservoir 4, an electric pump 5 and a control device 6. Reference numeral 7 indicates the fabric to be ironed. The soleplate 2 is provided with a steam chamber 39 for generating steam. A duct 40 connects the water reservoir 4 via pump 5 with the steam chamber 8. A outlet duct 41
10 connects a steam outlet 42 of the steam chamber 39 with a nozzle 43 provided in a cavity 44 in the soleplate 2. The lower end of the cavity comprises the outlet opening 45. The iron further comprises a reservoir, preferably in the form of a replaceable cartridge 46 for containing an additive liquid. A supply duct 47 connects the cartridge 46 with the outlet duct 41 for adding additive liquid to the steam. The additive flow can be controlled by means of
15 an electric valve 48 provided in the duct 47. The outlet duct 41 is provided with a pressure detector 49 for detecting the pressure of the steam in the outlet duct 41. The electric pump 5, the pressure detector 49 and the electric valve 48 are electrically connected to the control device 6. The operation is as follows: presumed that the soleplate 2 is hot enough to produce steam in the steam chamber 8 the pump is started and water is pumped through duct 40 to the
20 steam chamber 8 where steam is generated. The generated steam causes a pressure in the outlet duct 41, which is sensed by the pressure detector 49. When the generated detection signal exceeds a predetermined threshold value, a signal is sent to the control device 6 whereupon the electric valve 48 is opened to add an amount of additive liquid to the steam to obtain a fine spray of steam with additive.

25 The iron as described in all above mentioned embodiments can also be provided with a motion sensor (50), e.g. a well known ball type motion sensor. Such a motion sensor generates a motion signal in response to certain movements of the iron. Preferably these movements are movements in the ironing direction. Thus, when a user starts to make a to and fro ironing movement the motion signal is generated. In such an iron the delivery of
30 spray, foam or steam will only take place when the control means (6) receives a detection signal and a motion signal.

The claimed iron according to the invention can also be an iron suitable for use in an so-called ironing system, which comprises a stand and an electric iron, said stand

being provided with a water reservoir and boiler. Steam generated in the boiler is delivered to the iron through a flexible tube.

CLAIMS:

1. Electric iron having a housing and a soleplate in which at least one outlet opening is provided, means for generating a fine liquid spray or foam or steam and means for delivering said generated fine liquid spray or foam or steam through said outlet opening,
characterized in that the iron is provided with detection means for detecting
5 the presence of a surface in the proximity of the soleplate and for generating a detection signal in response to said detection, and with control means for controlling the delivery of said fine liquid spray or foam or steam in response of said detection signal.
2. Electric iron as claimed in claim 1, characterized in that the detection means
10 comprise a movable spring biased contact element, said element activating a switch for generating said signal when the soleplate is positioned against said surface thereby depressing said element.
3. Electric iron as claimed in claim 1, characterized in that the detection means
15 comprise resilient means provided between the housing and the soleplate, said soleplate being movable with respect to said housing against the force of said resilient means, and comprise a switch provided between the soleplate and the housing for generating said signal, said switch being activated when the iron is positioned against said surface with a force applied to the housing which is greater than the force of said resilient means.
20
4. Electric iron as claimed in claim 1, characterized in that the detection means
comprise a light emitter and a light sensitive receiver for receiving a reflected light beam from the emitter when the soleplate is in the proximity of said surface, said surface serving as a reflection surface for the light beam, said receiver generating said signal in response to the
25 reflected light beam.
5. Electric iron as claimed in claim 1, characterized in that the detection means
comprise a pressure detector for detecting the pressure of the generated steam in a flow path between the means for generating said steam and said at least one outlet opening in the

soleplate, said signal being generated in response of the pressure when the soleplate is in the proximity of said surface and when said signal exceeds a predetermined threshold value, said iron further comprising a supply duct for adding an additive liquid to the generated steam in said flow path, said supply duct having a valve which opens when said signal exceeds said predetermined threshold value.

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6. Electric iron as claimed in any one of the preceding claims, characterized in that the iron comprises motion detection means for generating a motion signal in response to a motion of the iron, said control means enabling said detection signal in response to said motion signal.

10

ABSTRACT:

An electric iron having a housing (1) and a soleplate (2) in which at least one outlet opening (10;15;34;45) is provided, means (8;19;28;39,43) for generating a fine liquid spray or foam or steam and means (5) for delivering said generated fine liquid spray or foam or steam through said outlet opening. According to the invention the iron is provided with
5 detection means (12,14;22,23;35,36;49) for detecting the presence of a surface (7a) in the proximity of the soleplate (2) and for generating a detection signal in response to said detection, and with control means (6) for controlling the delivery of said fine liquid spray or foam or steam in response of said detection signal. For example, the detection means
10 comprise a movable spring biased contact element (12) located in the soleplate (2), said element (12) activating a switch (14) for generating said signal when the soleplate is positioned against said surface (7a) thereby depressing said element (12).

Fig. 1

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1/4

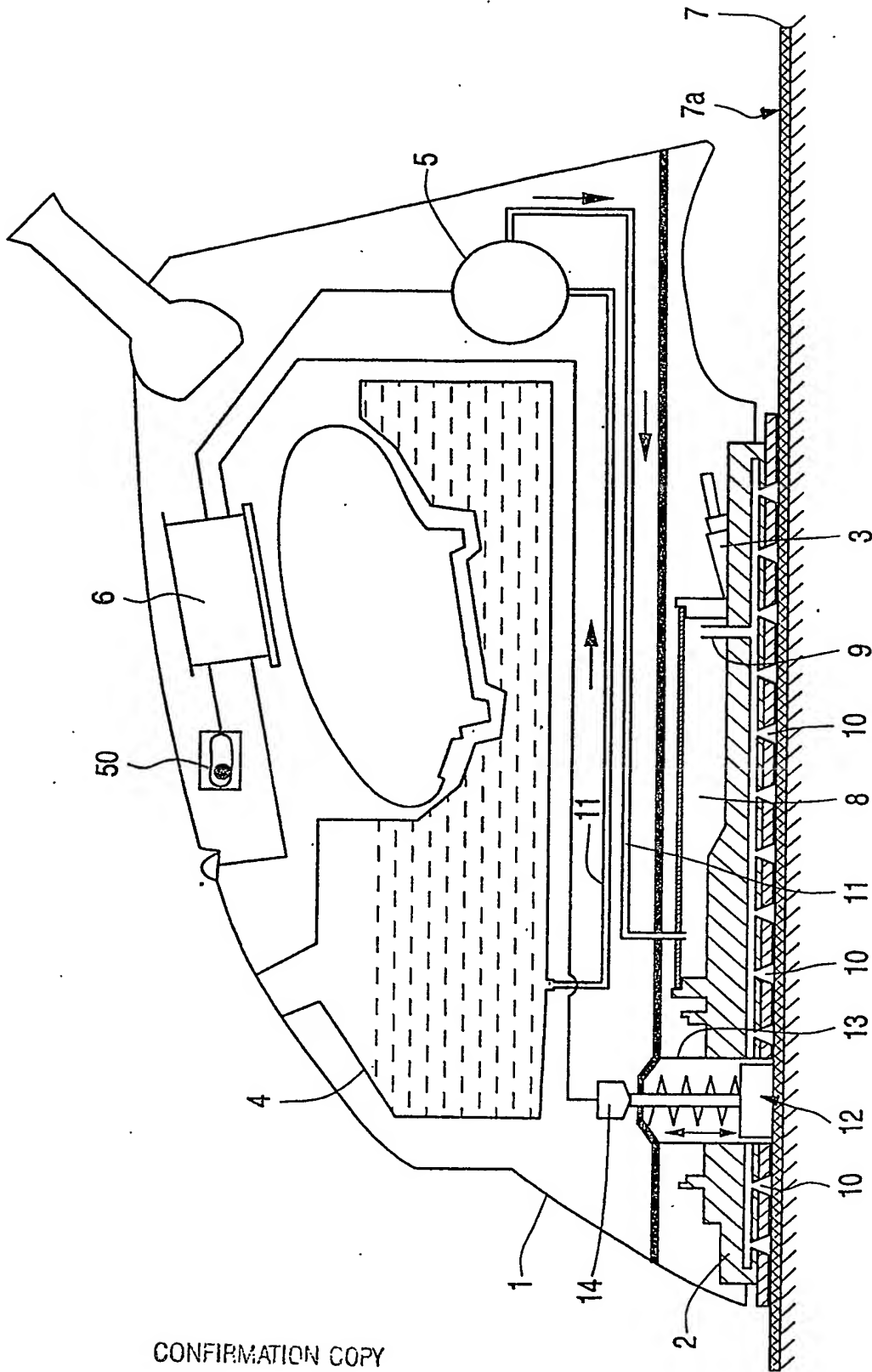


FIG. 1

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2/4

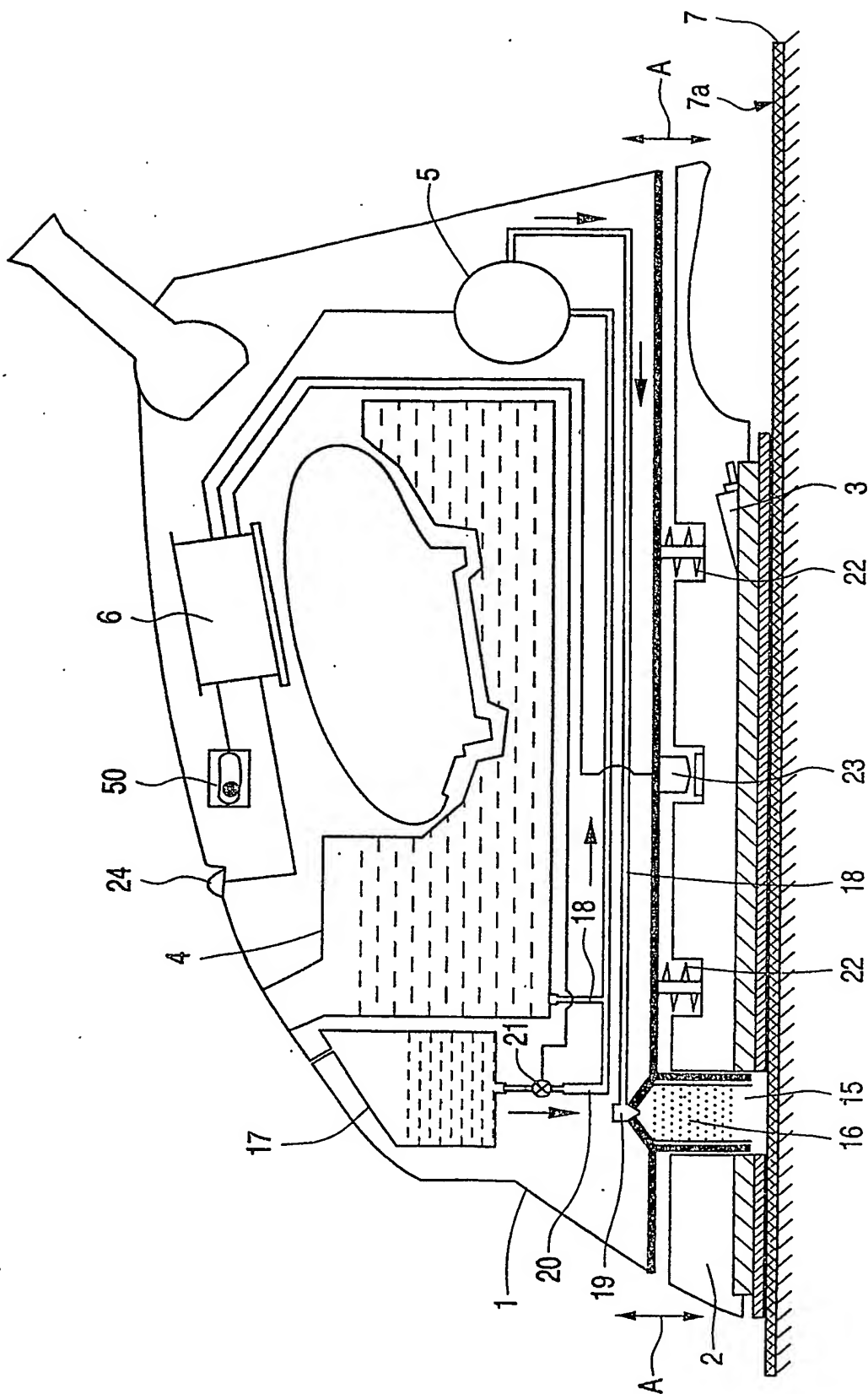


FIG. 2

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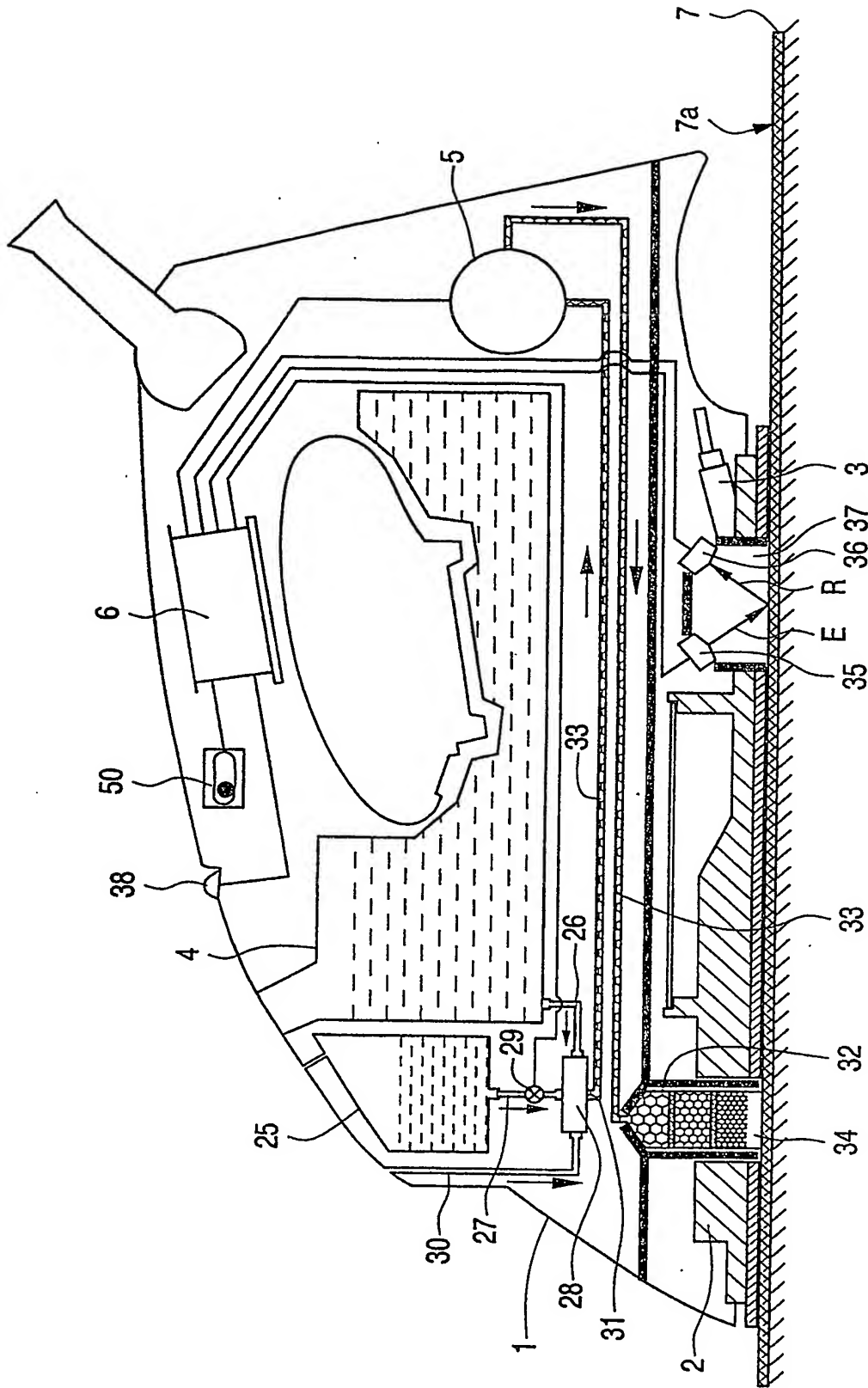
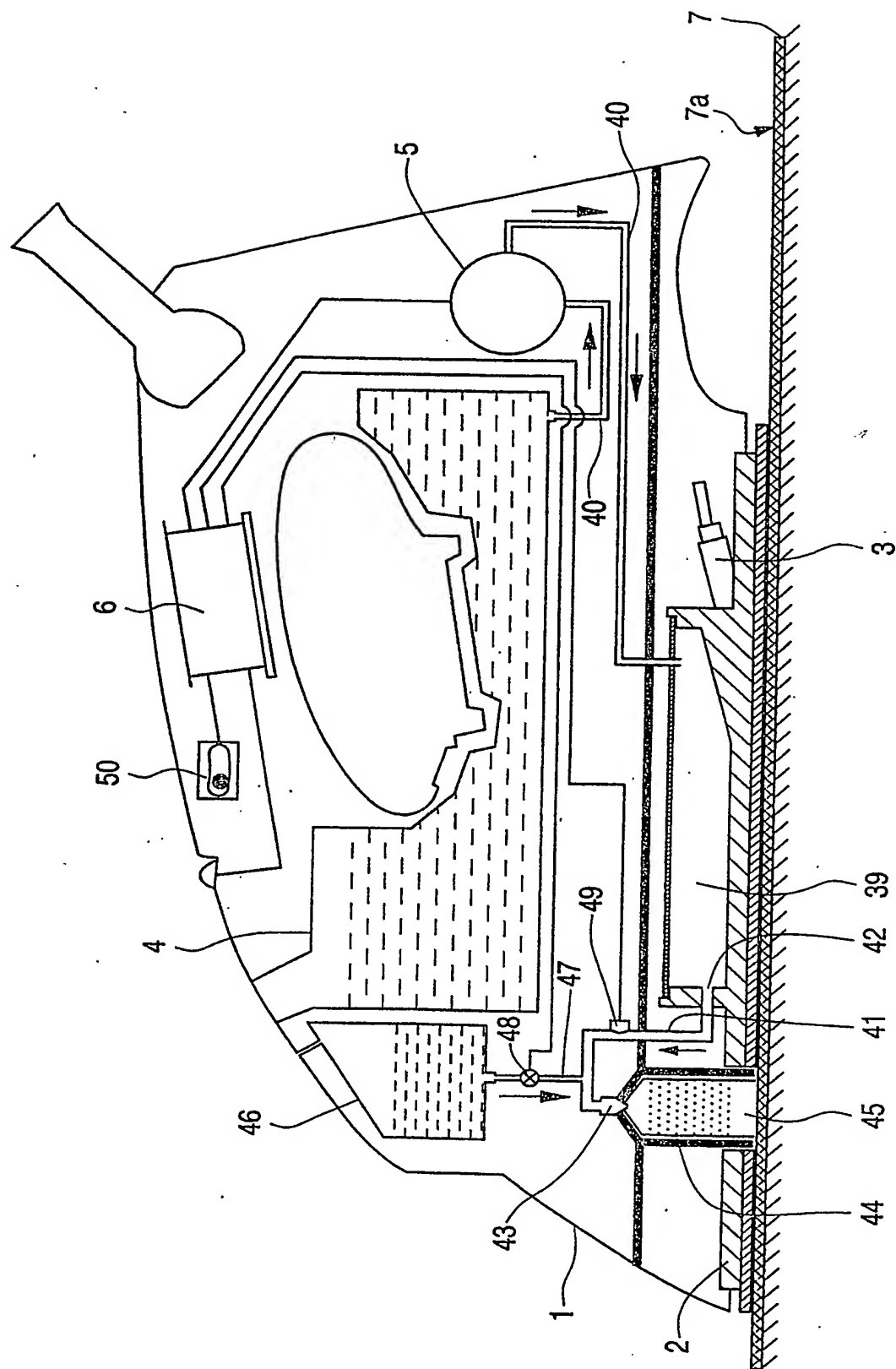


FIG. 3

4/4



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